

STUDIES ON THE LICHEN FAMILY THELOTREMATACEAE. 1.

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OCELLULARIA AMERICANA Hale, sp. nov.

Thallus corticola, epiphloëodes, obscure creméo-albidus, continuus, valde verrucosus, 3-5 cm latus; apothecia emergentia, prominentia, 1-2 mm diametro, medulla pallide subrosea; ostiolum rotundatum, 0.1-0.3 mm diametro; columella centralis conspicua, 0.2 mm lata, apice pruinosa; hymenium ca. 200 μ crassum; spora 1:nae, incolores vel aetate pallide obscurantes, transversim 18-22-septatae, 20-35 X 100-130 μ , I+.

Chemistry: Gyrophoric acid and unidentified pigments.

Holotype: Near Daytona, Florida, G. K. Merrill in 1911, no. 149 in Lichenes Exsiccati (US) (Fig. 1).

This conspicuous species, apparently endemic to the southern United States, has usually been identified in herbaria as Ocellularia domingensis (Fée ex Nyl.) Müller Argau. I have provisionally lectotypified O. domingensis with Lindig 2683 from Colombia since there is no specimen in the Fée or Nylander collections from Domingo. It contains hypoprotocetraric acid and lacks a columella. O. americana has an unusual chemistry, apparently gyrophoric acid, the only species in the family known to contain a C+ acid. It occurs rather commonly on oak trees in open woods or pastures.

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Additional specimens examined. SOUTH CAROLINA. Without locality, Ravenel s.n. (US). GEORGIA. Without locality, Ravenel s.n. (US). ALABAMA. Dauphin Island, Mobile Co., Tucker 7212 (LSU, US); Battles, Baldwin Co., Evans 85 (US); Sea Cliff, Baldwin Co., Evans 463; (US); Mobile, Mohr s.n. (US). FLORIDA. Juniper Springs, Marion Co., Thomson 5227 (US); Jacksonville, Calkins 99 (US); Lake Norris, Lake Co., Kelley s.n. (US); New Smyrna, Kelley s.n. (US); Ocala National Forest, Putnam Co., Harris 2208 (MSC, US); Hughs Island, Marion Co., Harris 2040 (MSC, US); Tomoka State Park, Volusia Co., Harris 2317 (MSC, US); north of Carrabelle, Franklin Co., Harris 1751 (MSC, US); Osceola National Forest, Columbia Co., Harris 3038 (MSC, US); Porter Lake, Liberty Co., Harris 1657 (MSC, US). MISSISSIPPI. Bay St. Louis, Langlois 140 (US). LOUISIANA. Abita, Langlois 524 (US); Covington, Langlois 145 (US); Ravine aux Cannes, Langlois 802 (US); Slidell, Langlois 149 (US).

OCELLULARIA CONPSOROMICA Hale, sp. nov.

Thallus corticola, epiphloeodes, pallide olivaceo-albidus, tenuis, continuus, opacus, minute verrucosus, 6-8 cm latus; apothecia emergentia, 0.7-1.0 mm diametro; ostiolum rotundatum vel irregulare, 0.3-0.5 mm latum; columella centralis lata, 0.5 mm diametro; hymenium 100-120 μ crassum; sporae 8:nae, incolores, transversim 7-septatae, 5-7 X 16-22 μ , I+.

Chemistry: Conpsoromic acid only.

Holotype: Ulu Gombak Forest Preserve, Selangor, Malaya, elev. 300 m, M. E. Hale 30031, 5 March 1965 (US) (Fig. 2).

The most unusual feature of this species is the presence of consporomic acid. This as yet structurally unidentified acid occurs as a nearly constant component with psoromic acid, lying below it in the usual thin-layer chromatographic tests. This is the first report of the acid occurring alone. It reacts P+ yellow as does psoromic acid. The only psoromic acid-containing species of similar morphology is the imperfectly known O. discoidea (Ach.) Müller Argau, an African species with a wide columella but less emergent apothecia and smaller pores (see Hale, 1972).

OCELLULARIA NYLANDERIANA Hale, nom. nov.

Ascidium majorinum Nyl. var. longius Nyl. Sert. Lich. Tropic. Labuan et Singapore, p. 20, 1891. Type specimen: Singapore, E. Almquist in 1879 (H, lectotype) (Fig. 3).

This is another of the Ascidium-type Ocellularia so common in Southeast Asia. It differs from O. majorina (Nyl.) Zahlbr. in chemistry and external features. O. majorina has hypoprotocetraric acid (Culberson and Hale, 1973) and is actually synonymous with O. trlyphica (Kremph.) Zahlbr. O. nylanderiana contains an unknown acid characteristic of O. olivacea (Fée) Müller Argau and a second higher spot in hexane-ether-formic known along with the "olivacea" unknown in O. chonestoma (Lgt.) Zahlbr. Chicita Culberson has designated these as unknowns TML-1 and TML-2. It differs from O. chonestoma in having more strongly emergent apothecia and much larger spores ($20 \times 120\mu$ vs. $8 \times 20\mu$). The species grows in the canopy of dipterocarp forests at low elevation.

Additional specimens examined. PHILIPPINES. Tungao, 40 km SW of Butuan City, Hale 25057 (US); Quezon National Park, Luzon, Hale 26857 (US).

OCELLULARIA THRYPTICA Hale, sp. nov.

Thallus corticola, epiphloeoed, cinereo-albidus, nitidus, crebrus, 0.25 mm crassus, friabilis, usque ad 10 cm latus; apothecia immersa, 0.3-0.7 mm diametro; columella centralis deficiens vel paucely evoluta, ca. 0.15 mm diametro; ostiolum rotundatum, variabile, 0.5-0.2 mm diametro; hymenium $140-150\mu$ crassum; sporae 6-8:nae, incolores, transversim 6-7 septatae, $8-11 \times 30-40\mu$, I+.

Chemistry: Protocetraric acid.

Holotype: Morne Leger Trail, Parc National de Guadeloupe, Guadeloupe, elev. 500 mm, M. E. Hale 37374, 9 May 1972 (US) (Fig. 4).

The thallus is unusual in bulging out in folds that break away from the substratum and easily crumble. The medulla is very thick, with vertically arranged crystal inclusions similar to those in the well-known Leptotrema wightii (Tyl.) Müller Argau. The only related species is Ocellularia immersa (Eschw.) Hale, nov. comb. (basionym: Thelotrema immersum Eschw. in Martius, Flora Brasiliensis, vol. 1, p. 177. 1833), which has a grainy rather than nitid smooth thallus and much smaller irregular pores. O. thryptica grows in the submossy forest on lower trunks of small trees often exposed to strong trade winds. It is not known from any other islands in the Lesser Antilles.

Additional specimens examined. GUADELOUPE. Same as type, Hale 31608 (US); Mamelles de Pigeon trail, Parc National de Guadeloupe, elev. 600-700 m, Hale 31619 (US).

THELOTREMA GRANDE Hale, sp. nov.

Thallus corticola, epiphloeoed, pallide brunneolus vel olivaceo-flavidus, opacus, continuus, 20-40 μ crassus, usque ad 10 cm latus; apothecia valde emergentia, 1-2 mm diametro; columella centrali evoluta; ostiolum rotundatum, 0.6-0.1 mm diametro, margine valde prominente; hymenium 300-400 μ crassum; sporae 1:nae, incolores, murales, transversim ca. 26-sepatatae, longitudinale 6-8-sepatatae, 40-50 X 200-400 μ .

Chemistry: Hypoprotocetraric acid, 4-O-demethylnotatic acid, 4-O-methylhypoprotocetraric acid, and unknown Q-1 (Culberson and Hale, 1973).

Holotype: Florida, about 30 km SE Butuan City, Agusan Prov., Philippines, M. E. Hale 25394, July 1964 (US) (Fig. 5).

The raised ring around the pore is very similar to that in Thelotrema massalongi (Mont.) Zahlbr., a related species with salacinic acid in Southeast Asia. The large apothecia are easily visible without magnification. The species is typically found on canopy branches in lowland dipterocarp forests.

Additional specimens examined. PHILIPPINES. Same as type, Hale 25421 (US); west of Ipil, Zamboanga del Sur, Hale 24759 (US); 25 km SE Labason, Zamboanga del Norte, Hale 24771 (US); Tungao, 40 km SW Butuan City, Agusan, Hale 24994 (US); Mt. Bulusan, Luzon, Elmer 15791, 15860 (US). SABAH. Near Mt. Silam, Hale 30303, 30137 (US); Sibuga Road, near Sandakan, Hale 33685A (US).

THELOTREMA GUADELOUPENSIS Hale, sp. nov.

Thallus corticola, epiphloeoed, tenuis, cinereo-albidus, nitidus, aetate rimosus, ca. 5 cm latus; apothecia emergentia, 0.8-1.0 mm diametro, excipula striata, laceratula; columella nulla; ostiolum ca. 0.1 mm diametro, irregulare; hymenium ca. 240 μ crassum; sporae 2-4:nae, incolores, murales, transversim 17-24-septatae, longitudinale 5-7-septatae, 22-25 X 75-85 μ , I-.

Chemistry: Stictic and constictic acids.

Holotype: Road to Soufrière, Parc National de Guadeloupe, Guadeloupe, elev. 900-1100 m (elfin forest zone), M. E. Hale 31633, 8 May 1972 (US) (Fig. 6).

An unusual feature of this species is the formation of several weakly carbonized ascocarp walls, produced successively as in the Graphidaceae but here forming concentric rings and an irregular lacerate almost pulverulent area around the pore. A similar species, T. novae-zelandiae Szatala, has identical chemistry but the apothecia are twice as large and lack striate walls.

THELOTREMA NORSTICTICUM Hale, sp. nov.

Thallus corticola, epiphloeoedodes, cinereo-albidus, continuus, crebrus, 0.6 mm crassus, ca. 6 cm latus; cortex superior distinctus, amorphus, 10 μ crassus; apothecia numerosa, immersa, 0.1-0.2 mm diametro; columella nulla; ostiolum rotundatum, 0.06 mm diametro, margine albo-annulatum; hymenium 70-80 μ crassum; spora 8:nae, incolores, murales, transversim 3-septatae, longitudinale 1-septatae, 6-8 X 12-14 μ , I+.

Chemistry: Norstictic acid and a trace of (?) connorstictic acid.

Holotype: Cats Hill Road, logging area in virgin forest, Trinidad, elev. about 70 m, M. E. Hale 37369, 21 April 1972 (US) (Fig. 7).

This species grows on canopy branches, a typical habitat for the very similar T. clandestinum Fee, which differs in containing psoromic acid and in lacking a raised whitish ring-like area around the pore. Norstictic acid is extremely rare in Thelotrema and this is the first record of a K+ acid in the clandestinum group.

THELOTREMA SANTESSONII Hale, sp. nov.

Thallus et apothecia ut in T. glaucopallens Nyl. sed ab eo pustulas bullatas fragiles formante differt.

Holotype: 45 km south of Guiglo, cercle of Man, Ivory Coast, R. Santesson 10443 bis, 4 August 1954 (UPS; isotype in US) (Fig. 8).

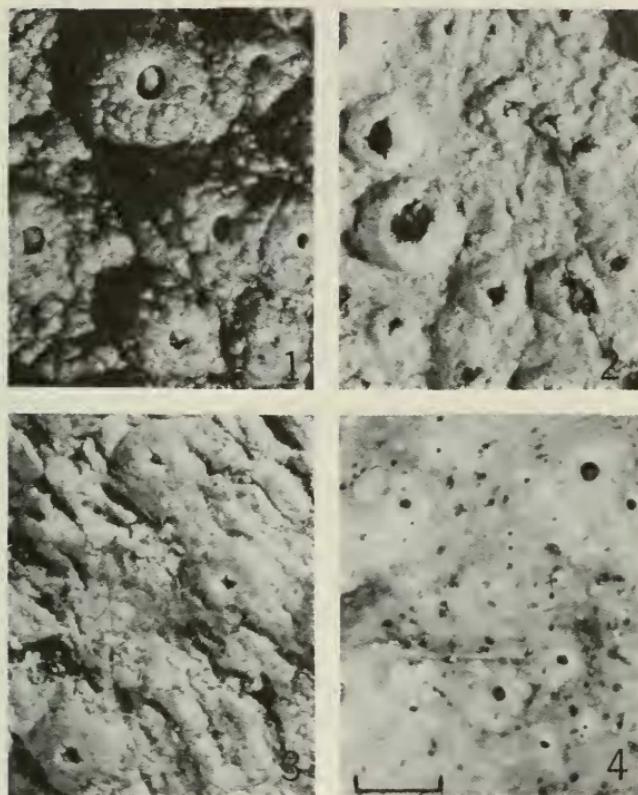
The thallus is thin, nitid, and greenish, as in T. glaucopallens a pantropical species, but large irregular hollow pustulelike excrescences, up to 1 mm tall and 1 mm in diameter, form over the whole thallus surface. These are extremely fragile and easily break open or crumble, without forming soredia. The spores are muriform, 10-13 X 20-24 μ , and negative with iodine. The chemistry is also identical with T. glaucopallens, stictic and constictic acid. The species appears to be restricted

to Africa. It is named in honor of Dr. Rolf Santesson, who brought this unusual species to my attention.

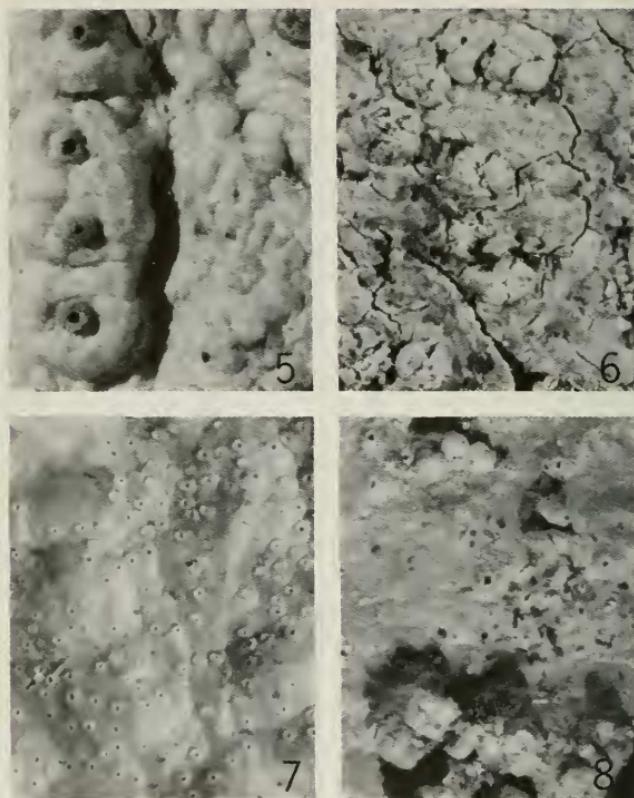
Additional specimens examined. IVORY COAST. 25 km south of Guiglo, cercle of Man, Santesson 10441h (UPS, US); 6 km southeast of Zouepo, cercle of N'Zérékoré, Santesson 10598b (UPS, US); 45 km north of Abidjan, cercle of Agboville, Santesson 10379b (UPS, US). TANZANIA. Amani, Tanga Prov., Santesson 23122 (UPS, US).

References

- Culberson, C. F. and M. E. Hale, Jr. 1973. 4-O-Demethylnotatic acid, a new depsidone in some lichens producing hypo-protocetraric acid. *Bryol.* 76:77-84.
- Hale, M. E., Jr. 1972. Typification of species in the lichen family Thelotremaeae described by Acharius. *Bot. Notiser* 125:186-198.



Figs. 1-4. 1. Ocellularia americana (Merrill 129). 2. O. consporomica (Hale 30031). 3. O. nylanderiana Hale (Almqvist s.n. in H). 4. O. thryptica (Hale 37374). Scale in Fig. 4 shows 1 mm.



Figs. 5-8. 5. *Thelotrema grande* (Hale 25394). 6. *T. guadeloupense* (Hale 31633). 7. *T. norsticticum* (Hale 37369). 8. *T. santessonii* (Santesson 10443 bis in UPS). Same scale as in Fig. 4.